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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,284	09/26/2006	Andre Witzmann	3839	6105

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Striker Striker & Stenby
103 East Neck Road
Huntington, NY 11743

EXAMINER	
HORNING, JOEL G	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
08/10/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,284	WITZMANN ET AL.	
	Examiner	Art Unit	
	JOEL G. HORNING	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) *10-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09-26-06;04-10-08;08-05-08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 10-15 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on May 8th, 2009.

Information Disclosure Statement

2. The information disclosure statement filed August 5th, 2008 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. The crossed out reference was missing several pages including the english abstract.
3. The information disclosure statement filed September 26th, 2008 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. The crossed out reference was not provided. However, applicant's did provide GB 2208383, so it is possible that was the reference applicant intended to cite.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-9 and 16** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. **Claims 1 and 16** recite the limitation: "...refractory material composed of fireclay, light-weight refractrory bricks, silimanite bricks, zirconium and zirconium-containing bricks, and fusion-cast bricks with compositions of Al2O3, SiO2, ZrO2 and/or MgO or CrO..."
6. This is confusing and indefinite for at least three reasons.
7. First, this is an improperly written markush group, which may be read to require that at least 6 different objects be laser treated: 1) fireclay, 2) light-weight refractory bricks, 3) silimanite bricks, 4) zirconium, 5) zirconium-containing bricks and 6) fusion cast bricks, though from applicant's specification, this is not what is intended. For the purpose of examination, it will be read as if it stated "...a refractory material selected from the group consisting of fireclay, light-weight refractory bricks..."
8. Second, it is unclear if the light-weight refractory bricks are required to be formed of fireclay, or if fireclay and light-weight refractory bricks are separate materials. For the purposes of examination, it will be assumed that they are separate materials.
9. Third, it is unclear if the fusion-cast bricks are composed of Al2O3, SiO2, and one or more materials selected from the group of ZrO2, MgO and CrO, or if there is some further limitation on the combination of the materials (e.g. can ZrO2 exist with CrO or

can it only exist with MgO?)? For the purposes of examination, it will be assumed that fusion-cast bricks are composed of Al2O3, SiO2, and one or more materials selected from the group of ZrO2, MgO and CrO.

10. **Claims 1-9 and 16** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "light-weight" in claims 1 and 16 is a relative term which renders the claim indefinite. The term "light-weight" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Furthermore, does the material need to be less than a certain density to be considered "light-weight" or is there a maximum weight for each brick? For the purposes of examination, whatever refractory bricks are applied will be considered “light-weight” bricks.

Claims 2-9 are rejected for being dependent upon a rejected claim.

11. **Claim 3** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process*

Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term “energy density” in claim 3 is used by the claim to mean “power per area”, while the accepted meaning is “energy per area.” A watt is a unit of power, not energy. The energy density would be Joules/mm^2. or W*s/mm^2. The term is indefinite because the specification does not clearly redefine the term and a practitioner is left uncertain if applicant has misidentified the power density or used incorrect units for the energy density. For the purposes of examination, it will be assumed that applicant intended "power density."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. **Claims 1, 3 and 6-7** are rejected under 35 U.S.C. 102(b) as being anticipated by Bradley et al (Materials Science and Engineering A (2000) 204-212) as evidenced by Triantafyllidis et al (Applied Surface Science 186(2002) 140-144), both were cited and supplied for the previous restriction requirement.

The instant claims are directed towards a method for treating refractory material composed of a material which can be “light-weight” refractory, which may be in contact with a glass melt, wherein the treatment is exposing the surface to laser radiation.

Bradley et al is directed towards a process for treating alumina based refractory bricks, which are considered light weight (Bradley et al contrasts their alumina based refractory with other "denser refractories" so they are relatively light weight compared to these other refractories), by exposing their surface to laser radiation, which increases the density of the surface and increases their resistance to corrosion (abstract). The examiner notes that the claim language does not require that the refractory be in contact with a glass melt **(claim 1)**.

13. Regarding **claim 3**, Bradley et al teaches using a power density of $4W/mm^2$ (page 210, section 3.2).

14. Regarding **claims 6 and 7**, Bradley et al teaches using a CO_2 laser (page 205, section 2.2), which, as evidenced by Triantafyllidis et al has a wavelength of 10.6 microns (page 141, section 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. **Claims 2 and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al (Materials Science and Engineering A (2000) 204-212) in view of Petitbon (US 4814575) as evidenced by Hancock et al (US 3929498).

Claim 8 further requires that the surface be sprayed with a powder or a solution before or during the laser treatment or that the ceramic body be infiltrated with a solution that includes zirconium or aluminum containing compounds.

Bradley is directed towards methods of laser treating ceramic bodies so that the amount of porosity on the surface of the refractory is decreased, which improves the corrosion and spalling resistance of the refractory (page 204, abstract and introduction), but it does not teach adding a powder to the surface during laser exposure.

However, Petitbon is also directed towards methods of laser treating ceramic bodies so that their surface porosity is reduced. It teaches that by spraying a ceramic powder onto the substrate during the laser treatment, so that the powder and substrate surface melt, the molten powder particles will fill the surface porosity, thus reducing the porosity of the substrate surface and improving the properties (thermal expansion coefficient, residual stress, etc) of the surface (col 2, line 40 through col 3, line 13).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention performing the process of Bradley et al to spray a powder at the

substrate so that they melt together during laser treatment in order to further reduce the surface porosity, thus increasing the corrosion and spalling resistance as well as other properties of the substrate **(claim 8)**.

16. Regarding claim 2, neither Bradley et al nor Petitbon specify what the surface temperature of the substrate heated to as a result of the laser processing. However, as stated above Petitbon does teach powder is heated by the laser so that it is molten on the substrate surface. Bradley et al further teaches using zirconia powder on alumina based substrates (col 4, lines 30-35). As discussed previously, Hancock et al teach that zirconia melts at nearly 2650°C.

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to heat the zirconia with the laser so that it melts and that as the molten zirconia powder forms the surface of the refractory material, that zirconia part of the surface has been heated by the laser to at least 2650°C, which is above 2000°C **(claim 2)**.

17. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al (Materials Science and Engineering A (2000) 204-212) in view of Brennan et al (US 4415672).

Bradley et al is directed towards treatments for glass ceramics (alumina/silica)(page 205, section 2.1), but does not teach tempering the the glass ceramic refractory after the laser treatment.

However, Brennan et al is also directed towards glass-ceramics and treatments for them. It teaches that they have good thermal properties and

resistance to thermal shock, but that in order to increase their mechanical strength, a variety of tempering processes are performed upon them (col 1, lines 52-68).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to further temper the glass-ceramic refractory after the laser treatment in order to increase the strength of the material.

18. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over Elliott (US 5659564) in view of Bradley et al (Materials Science and Engineering A (2000) 204-212), as applied to claim 1 above.

The independent claim 16 is a product by process claim that requires that a laser treated surface, that is in contact with a glass melt.

Elliott is directed towards glass furnaces. It teaches that in glass furnaces, a glassy slag runs down the walls of the furnace, eroding the refractory material, which then needs to be cleaned and can contaminate the glass (abstract). In these glass furnaces, the walls **68** are made from conventional refractory materials and are in contact with the glass melt **60** (col 4, lines 22-31).

However, Bradley et al teaches using the laser treated refractory brick, as described for claim 1 above, in furnaces where they provide better slag corrosion protection than non-treated refractory bricks (page 204, introduction).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to make use of the laser treated refractory of Bradley et al as the refractory in a glass furnace, since the Bradley et al refractory was designed to be suitable for furnace use and would provide more slag corrosion protection than other

refractories, which would produce the claimed method of placing a laser treated surface in contact with a glass melt **(claim 16)**.

Conclusion

19. No current claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792